11:45

746-6 Three-Dimensional Echo Assessment of Volume, Mass and Function in Children With Single Ventricles

Karen Altmann, Zhanqing Shen, Lawrence M. Boxt, Donald L. King, Welton M. Gersony, Lindsey D. Allan, Howard D. Apfel. *Columbia University, New York, NY*

Determination of ventricular volume, mass and function is useful in the evaluation of patients with single ventricle (SV). The relative ease of acquisition of 2D Echo has established it as the mainstay for routine non-invasive cardiac imaging. However, SV geometry is frequently distorted, making quantitative assessment unreliable. Analysis by 3D echo requires no geometric assumptions and has been validated in biventricular hearts. Purpose: to compare 3D echo measurement of ventricular volume, function and mass in patients with SV to results obtained by MRI. Methods: 6 patients (ages 15 months to 22 years) with SVs of left ventricular morphology were studied by 3D echo using a real time scanner, an acoustical spatial locator and line of intersection display. Volumes were calculated using a surface reconstruction algorithm. MRI values were determined in each-patient from series of short axis gradient reversal acquisitions. Statistical analysis was by linear regression and the Bland-Altman method.

Results: n = 6, EDV = 44–154 ml; ESV = 21–80 ml; EF = 44%–73%; mass = 34–186 gm.

3D vs MRI

	Regression		Bias	Limits of Agreement	Interobserver
	r	SEE	(MRI-3D)	(± 2 SD)	Variability
EDV	0.97	13.9 ml	16.1 ml	25.2 ml	2.1%
ESV	0.99	6.8 ml	1.9 ml	13.8 ml	10.6%
EF	0.83	7.4 ml	6.2%	13.2%	3.6%
Mass	0.98	11.2 gm	12.7 gm	22.2 gm	4.1%

Summary: 3D echo estimates of SV volume, mass and EF show a strong correlation with MRI. There is a 3D echo bias underestimating MRI EDV and mass. Interobserver variability of 3D echo measurements is small. Preliminary results suggest that 3D echo provides accurate quantitative data in patients with SV. This data may prove useful in patient assessment for the Fontan operation, as well as later management.

747 Radiofrequency Catheter Ablation for Atrioventricular Nodel and Atrioventricular Reentrant Tachycardias

Tuesday, March 26, 1996, 10:30 a.m.–Noon
Orange County Convention Center, Room 315

10:30

747-1 Atrioventricular Nodal Reentrant Tachycardia: Is the Reentrant Circuit Always Confined in the Right Atrium?

Claudio Tondo, Kenichiro Otomo, James McClelland, Karen Beckman, Mario Gonzalez, Lawrence Widman, Mauricio Arruda, Mathias Antz, Hiroshi Nakagawa, Ralph Lazzara, Warren Jackman. *University of Oklahoma, Okla. City, OK*

Radiofrequency catheter ablation (RF) is highly effective in eliminating AV nodal reentrant tachycardia (AVNRT) by targeting the atrial connection with the slow pathway (region recording the A_{SP} potential) between the tricuspid anulus and coronary sinus ostium. We report 4 patients in whom AVNRT was eliminated by ablation at the mitral anulus after ablation at the right posterior septum failed to eliminate AVNRT. Three pts had slow/fast AVNRT and one had fast/slow AVNRT. Ablation within the coronary sinus resulted in transient response (1 pt) or no effect on inducibility of AVNRT 3 pts). The ablation catheter was placed across an atrial septal defect 1 pt), transeptal puncture (2 pts) or retrograde transaortic approach 1 pt). Retrograde slow pathway conduction was present only in the pt with fast/slow AVNRT. Earliest retrograde atrial activation was located on the posterolateral mitral anulus, 3 cm from the septum and ablation there (1 RF application) produced accelerated junctional rhythm (AJR) and eliminated slow pathway conduction and AVNRT. In 2 others slow pathway ablation was performed successfully at the posterior/posteroseptal mitral anulus where a potential like the A_{SP} potential (high frequency potential following local atrial potential in sinus rhythm) was recorded and where late atrial extrastimuli during AVNRT advanced the next H potential and reset the tachycardia. Ablation (3 RF applications in both pts) on the mitral anulus produced AJR with 1:1 retrograde fast pathway conduction and modified slow pathway conduction and eliminated AVNRT. In the remaining pt with slow/fast AVNRT, RF at the posteroseptal mitral anulus eliminated retrograde fast pathway conduction and AVNRT without affecting antegrade fast pathway conduction. Conclusions: The atrial end of the slow pathway or fast pathway participating in AVNRT may be located along the mitral anulus in some pts.

10:45

747-2 Predictors for Long-Term Success of Slow Pathway Ablation in Recurrent AV Nodal Reentrant Tachycardia Without Reproducible Inducibility

Stephan Willems, Riccardo Cappato, Christian Weiß, Carsten Rickers, Thomas Meinertz, Karl-H. Kuck. *Depts. of Cardiology Univ. Hospital Eppendorf and AK St. Georg, Hamburg, Germany*

The inability to determine suppression of inducibility prevents assessment of the acute success in pts with non-inducible (NI) or non-reproducibly inducible (N RI) AV nodal reentrant tachycardia (AVNRT) undergoing slow pathway (SP) radiofrequency catheter ablation (RFC). Out of 222 pts. with recurrent AVNRT referred for SP ablation, 23 (10%) (16 f, 7 m; 48.6 ± 11.5 years) presented with NI (n = 9) or N RI (n = 14) AVNRT despite isoproterenol infusion during programmed stimulation. All 9 Pts. in the NI group and 7 in the NRI group had dual anterograde AVN physiology at baseline. RF pulses were initially delivered right posteroseptally in the presence of presumed SP potentials and continued to more midseptal sites, if required. Endpoints were the occurence of junctional escape beats (JEBs) and/or abolition of dual AVN physiology. This was achieved in 21 of 23 pts. after 6 (range: 1–30) RF pulses. Dual AVN physiology persisted in 4 NI and 2 NRI pts. After 22.3 ± 9.4 months 20 pts. (87%) remained event free. Abolition of dual physiology (n = 10) was associated with successful outcome in all pts. In 6 out of 7 pts without dual physiology at baseline event-free follow-up was associated with induction of JEB bursts rather than single JEBs. Recurrence of AVNRT was associated with the inability to abolish dual AVN physiology and to produce more than single JEBs in 2 of 3 pts. In the control group with RI AVNRT, 188 of 199 pts. (94%) had a symptom-free follow-up of 21.5 ± 8.6 months.

Conclusion: In pts with NI or NRI AVNRT, SP ablation guided by empirical endpoints is associated with a success rate comparable to that in pts with RI AVNRT. Abolition of baseline dual AVN physiology predicts a symptom-free outcome; in the absence of dual AVN physiology at baseline, bursts rather than single JEBs during RFC pulses are associated with a symptom-free outcome.

11:00

747-3 Developmental Characteristics of Atrioventricular Node Reentry (AVNRT) in Children, Adolescents and Adults

Daniel L. Fink, Kara J. Quan, Mark D. Carlson, Lee A. Biblo, George F. Van Hare. *Departments of Pediatrics and Medicine, Case Western Reserve University, Cleveland, OH*

Methods: We studied 93 patients aged 5.2–92.7 years (< 12 yrs, n = 23, 12–20 yrs, n = 32, > 20 yrs, n = 38) with typical AVNRT undergoing electrophysiologic study. We excluded those with complex congenital heart disease. Radiofrequency ablation was attempted in 79/93 (85%), successfully in 79/79, with one major complication (high grade AV block). We examined the following characteristics: presence of dual AV node physiology, whether AVNRT was inducible in baseline without isoproterenol, mean fast pathway effective refractory period (FPERP) pre- and post-ablation, and AVNRT cycle length (CL) (all times in ms).

Results:

	Age groups			p =
	< 12 yrs	12–20 yrs	> 20 yrs	
Dual AVN physiology	17/23	16/32	35/38	0.003*
Baseline inducibility	14/23	18/32	23/38	0.919*
FPERP pre-	295	345	349	0.036†
FPERP post-	231	286	336	0.0001†
pre- vs post-¶	p = 0.001	p = 0.014	p = 0.230	0.001§
AVNRT CL	310	373	382	0.015†

*by Chi squared analysis, † by ANOVA, ¶ by paired t-test, §pre- vs post-, all 93 patients.

Conclusions: In patients with AVNRT, fast pathway refractoriness and tachycardia cycle length are age-dependent, being shorter in young patients. Fast pathway ERP shortened after ablation significantly in both pediatric groups. *Lack of demonstrable dual AV node physiology is common in adolescents,* as opposed to older or younger patients. The infusion of isoproterenol is necessary for AVNRT induction in a substantial percentage, regardless of age.